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Lower Big Ditch

Summary of 2015 Surface Water Monitoring Program Results

Washington State Department of Agriculture

Natural Resources Assessment Section

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Introduction

The Washington State Department of Agriculture has monitored pesticide concentrations in surface water throughout Washington since 2003. WSDA takes water samples during the typical pesticide use season (March through September). In 2015, 14 sites were monitored in Washington, four in Skagit County. State and federal agencies use this data to evaluate water quality and make exposure assessments for pesticides registered for use in Washington State.

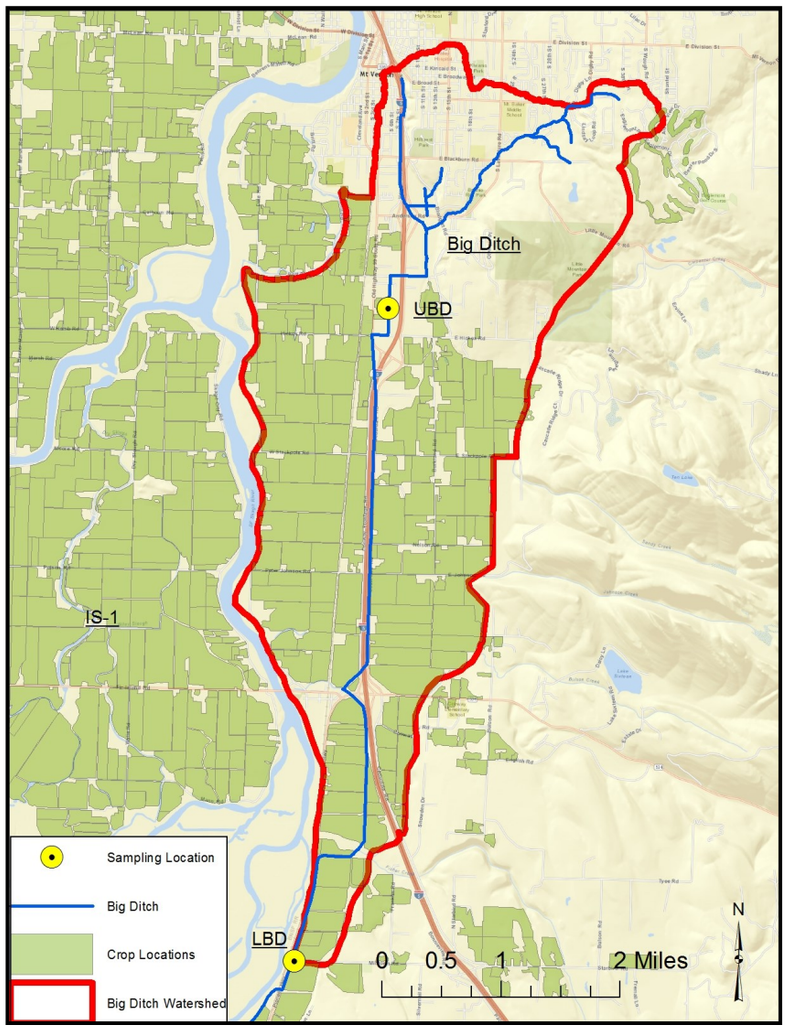
Study Area

WSDA has sampled water from Lower Big Ditch from 2006 through 2015. The entire watershed drains about 4,200 acres of farmland. The main crops include field corn, potato, grass hay and wheat. The majority of the watershed is agricultural land and also contains commercial and urban land cover further upstream. Lower Big Ditch provides habitat for chinook, coho, chum, kokanee salmon and steelhead*. The Skagit Valley (and the Big Ditch watershed) is also a crucial area for migratory waterfowl, including trumpeter swans, tundra swans, snow geese, and other birds.

* Washington State Department of Fish and Wildlife

Sampling Details

- Sampled water for 25 weeks in 2015 from March 9 through August 24.
- Water samples were tested for 206 chemicals: current and legacy insecticides, herbicides, fungicides, rodenticides, wood preservatives, and pesticide degradates.
- Sample analysis for pesticides and total suspended solids was conducted at Manchester Environmental Laboratory in Port Orchard, WA.
- General water quality parameters; dissolved oxygen, conductivity, pH, water temperature, and streamflow were measured at every sampling event.
- Air and water temperature (measured every 30 minutes) was monitored for the entire sampling season.



This table shows the pesticides detected, with dates and concentrations. They are color coded to identify which assessment criteria were surpassed. The assessment criteria used here are state and federal water quality criteria, reduced by half for safety. This 0.5 safety factor is used to make sure the criteria protect aquatic life and water quality issues are found early. Watersheds with detections above the criteria are prioritized for more monitoring and educational outreach. See http://agr.wa.gov/PestFert/natresources/SWM for more information.

Assessment Criteria	
May affect fish survival at sensitive life stages	
Additional level of protection for endangered species	
May affect invertebrate survival	
Nearing a pesticide state water quality standard	
May affect fish growth or reproduction with prolonged exposure	
May affect invertebrate growth or reproduction with prolonged exposure	
May affect aquatic plant growth	
May affect aquatic plant growth or reproduction with prolonged exposure	
Below all identified criteria	
No published criteria available	
Not detected (below detection limit)	
No Data	– –

Month and Day		Mar			Apr					May				Jun					Jul				Aug		
Analyte Name †	Use‡	9	18	23	1	6	15	20	29	4	11	18	27	2	8	16	22	30	6	15	20	28	4	10	17
2,4-D	H		0.079	0.056	0.13		0.77		0.077		0.077														
4,4'-DDE	D-OC															0.012									0.011
AMPA	H	--	--	--	--	--	0.17	0.19	0.28	0.12	0.38	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Azoxystrobin	F	0.291	0.49	0.271	7.05	0.377	10.8	0.879	0.319	0.22	0.14	0.086	0.11	0.052	0.039	0.037	0.02	0.02	0.024	0.012	0.02	0.023		0.009	
Bifenthrin	I-Py										0.14														
Boscalid	F							0.076	0.083	0.081	0.1	0.062	0.12												
Captan	F			0.43																					
Chlorothalonil	F				0.029																				
Chlorpropham	H	0.21	0.16	0.07	1.8	0.094	41	1.4	0.73	0.25	0.11	0.061													
Chlorsulfuron	H						0.027																		
Cyprodinil	F						0.011																		
Dicamba	H		0.021																						
Dichlobenil	H		0.02	0.037	0.059		0.068	0.015	0.02	0.013	0.017	0.014													
Difenoconazole	F	0.112	0.105	0.07	1.26	0.155	1.65	0.355	0.17	0.15	0.1	0.047	0.041	0.033	0.039	0.025		0.009	0.008	0.01	0.02	0.024	0.01	0.009	0.007
Dinotefuran	I-N	0.072	0.055	0.211	0.119	0.116	0.105	0.085	0.098	0.12	0.17	0.051	0.052												
Diuron	H	0.017	0.013	0.009	0.033	0.019	0.029	0.015	0.016	0.014	0.013		0.008	0.005	0.004		0.003	0.003				0.006			
Fludioxonil	F			0.22	0.94	0.33	1.3	0.59	0.34	0.24	0.27	0.17	0.17	0.099		0.049	0.05	0.079	0.045	0.032	0.044	0.027	0.014	0.019	0.015
Glufosinate-ammonium	H	--	--	--	--	--	0.017					--	--	--	--	--	--	--	--	--	--	--	--	--	--
Glyphosate	H	--	--	--	--	--	0.74	0.76	0.69	0.056	1.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Imazapyr	H		0.012		0.021		0.021	0.016	0.016	0.017															
Imidacloprid	I-N		0.029		0.43	0.008	0.021	0.016	0.02																
MCPA	H			0.035					0.28																
Mecoprop (MCPP)	H		0.056		0.071																				
Metolachlor	H	0.041	0.053	0.039	0.046	0.042	2.7	0.14	0.74	0.19	0.13	0.052	0.089						0.013						
Monuron	H							0.003		0.003															
DEET	IR										0.034							0.009	0.011	0.007					
Oxamyl	I-C																		0.004	0.001					
Pentachlorophenol	WP					0.023																			
Propiconazole	F				0.008		0.017	0.012																	
Pyraclostrobin	F							0.023																	
Sodium bentazon	H				0.11																				
Thiamethoxam	I-N		0.022		0.017		0.009		0.012				0.014												
Triclopyr acid	H		0.044				0.86	0.059	0.092		0.073	0.037													
Temperature	N/A	53.78	50.77	51.24	54.36	54.55	54	**66.49**	55.15	**63.82**	**64.76**	**65.97**	--	**61.2**	**74.86**	**71.06**	**72.97**	**75.87**	**76.73**	**71.33**	**78.37**	**70.12**	**73.29**	**70.93**	**69.08**
Dissolved oxygen	N/A	**5.55**	**5.13**	**6.98**	**6.58**	10.92	9.05	16.9	**6.75**	14.95	10.65	**7.63**	**5.3**	**5.25**	**6.39**	**6.09**	**6.8**	**3.79**	8.84	**6.73**	**7.87**	**5.6**	**7.05**	**4.18**	**4.13**
Percipitation	N/A	0	0	0.03	0.01	0	0	0	0.08	0.01	0	0	0	0.12	0	0	0	0	0	0	0	0	0	0	0
Streamflow	N/A	12.8	--	17.7	--	16.2	15.1	15.1	--	10.9	13.7	20.5	9.7	28.4	14.6	16.4	16.7	15.5	14.9	19.5	12.7	13.0	26.1	23.9	23.4
Total suspended solids	N/A	17	35	12	19.5	18	38	23	13	7	25	26	22	23	26	30	33	14	41	21	31	25	37	126	43

‡ C: Carbamate, D: Degradate, F: Fungicide, H: Herbicide, I: Insecticide, IR: Insect repellent, N/A: Not applicable, N: Neonicotinoid, OC: Organochlorine PY: Pyrethroid, WP: Wood preservative. †Units are as follows: pesticides, µg/L; temperature, °F; dissolved oxygen mg/L; percipitation, week t inches; streamflow, cfs; and total suspended solids, mg/L. **Bold**: Indicates a temperature or dissolved oxygen value above state water quality standards.

Results Summary

- There were 203 total pesticide detections in Lower Big Ditch, 6 of which were at levels above the assessment criteria for the following pesticides; metolochlor, bifenthrin, azoxystrobin and 4,4'-DDE.
- Difenoconazole was the most frequently detected pesticide.
- Common trade names for metolachlor are Stalwart, Tailwind , Parallel and Matador. Common product names for bifenthrin are Fanfare, Triple Crown and Sniper. Common trade names for azoxystrobin or combination products include Quilt, Abound, Dynasty. 4,4'-DDE is a breakdown product of DDT.
- Bifenthrin is a pesticide of concern in Washington State and is very toxic to fish. Bifenthrin has been detected in Skagit County above water quality criteria in the past.
- Lower Big Ditch had 101 less detections than Upper Big Ditch but had 2 or more that were above assessment criteria.
- The overall water quality is poor with both temperature and dissolved oxygen outside of the state water quality standards most weeks during the sampling season.

Recommendations

- Read and follow label directions to protect water quality.
- Eliminate drift and runoff to adjacent surface water.
- Implement best management practices, including conservation buffers, vegetative filter strips, sediment basins, and setbacks from water.
- Review pest control needs and select appropriate and less-toxic pesticides.
- Manage irrigation to prevent runoff, and check the weather forecast before application to prevent runoff due to rainfall.
- Maintain, inspect, and calibrate application equipment.